# SWEETTREAT™ SLURRY DESULFURIZATION TECHNOLOGY

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ABSTRACT

A new sulfur removal process utilizing traditional iron oxide in a very unique way. The process produces a highly effective technology to completely remove H2S and eliminate acid gas disposal, liquid chemical management and other environmental challenges.

The patented process is based on a proprietary granular Brimsorb™ . The granules are mixed with water to form a slurry that comes into contact with H2S-laden gas. The process is simple to operate, has a small footprint, and has VERY low capital and operating costs. The regenerable nature of the adsorbent reduce operating costs, but the non-hazardous elemental sulfur and iron oxide byproduct can easily be disposed of thereby minimizing any environmental impact.

Compared to the traditional liquid processes and Sulfur Recovery Units:

1. Adsorbent Capacity: the adsorbent is a proprietary amorphous hydroxyl iron oxide, which is regenerable thereby having high sulfur removal capacity.
2. Environmentally friendly: the slurry can be regenerated which reduces the wastewater discharge, and eliminates the secondary pollution caused by by-products in competitive processes.
3. Wide range of process applications: this process is also suitable for removing H2S from biogas, coke oven gas, associated gas, natural gas, gaseous and liquid streams from petrochemical industry.

## Overview

Brimsorb™ is a patented H2S removal absorbent developed in 2006 by SJ Environmental Corp. It has been proven in the treatment of biogas, coke oven gas, associated gas, landfill gas, refinery off-gas, LPG and natural gas. Commercial units have been utilized in Asia, and a multi-national major oil company in the US, will install the first slurry system in 2018.

Slurry Desulfurization Technology provides cost effective, environmentally friendly H2S removal for all types of gas and liquid streams. The core product, Brimsorb™, an amorphous hydroxyl iron oxide, provides high reaction activity within a wide range of operation conditions under normal temperature. The slurry capacity can reach up to 400% under anaerobic conditions. The Brimsorb™ can be regenerated with a sulfur cake as a byproduct without producing acid gas or SO2.

The process achieves H2S removal efficiencies of 99.9 %. The application has a range in size from a few tons to several thousand tons annually.

## Concept of Slurry Desulfurization Technology

The core of slurry system is the iron-based hydroxide chemical powder, patented desulfurizer. FeOOH has simple but essential layered structure, sufficient hydroxyl groups and hydrogen bonds, all lead to well-performed desulfurization.

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|---|---|
| $FeOOH+2H_2S \rightarrow FeSSH+2H_2O$ | Desulfurization |
| $FeSSH+O_2 \rightarrow FeOOH+2S$ | Slurry regeneration |

## Process Overview

The Slurry Desulfurization Technology is an operator-friendly option that uses the following process:

- Once-through Slurry Desulfurization Technology
- Once-through Brimsorb™ fixed-bed
- Sweet gas
- Recovery of Brimsorb™ slurry

Sour gas will be sent to the Absorber (a bubbling fluidized bed reactor) to remove H2S, and the sulfur-rich slurry will be oxidized and the Brimsorb™ recycled. Treated gas from the slurry will be continuously sent into the fixed beds to ensure a H2S concentration that is on spec. (Figure 1)

## Brimsorb™ Regenerating

The H2S dissolves in water, and then HS- reacts with Brimsorb™. Rich-slurry is then sent into a regenerator vessel to do a re-dox. Lean-slurry is then sent into the absorber again. The regeneration process reduces the amount of wastewater, as well as the cost of materials, and disposal treatment cost.

## Advantages

Slurry Desulfurization Technology provides highly efficient H2S removal, and handles a variety of different sour gas conditions. The key is the innovative amorphous Brimsorb™ technology, which exhibits high sulfur capacity and recoverability. Features of Slurry Desulfurization Technology include:

- Re-generable slurry, and slurry does not block pipes
- Low utility and operation costs
- Brimsorb™ slurry contains no toxic chemicals, produces NO secondary pollution (acid gas or SO2), and is environmentally friendly.
- Brimsorb™ slurry is neutral or weak based, low corrosion to the equipment
- Process operates over a wide temperature range
- Operates under extremely high H2S concentration flow
- Very little waste water, all water utility is recycled
- Clean off-gas (same component as air)

## Reference

Patent number: US8603215B2, US8647600B2, US8652427B2, US8591847B2

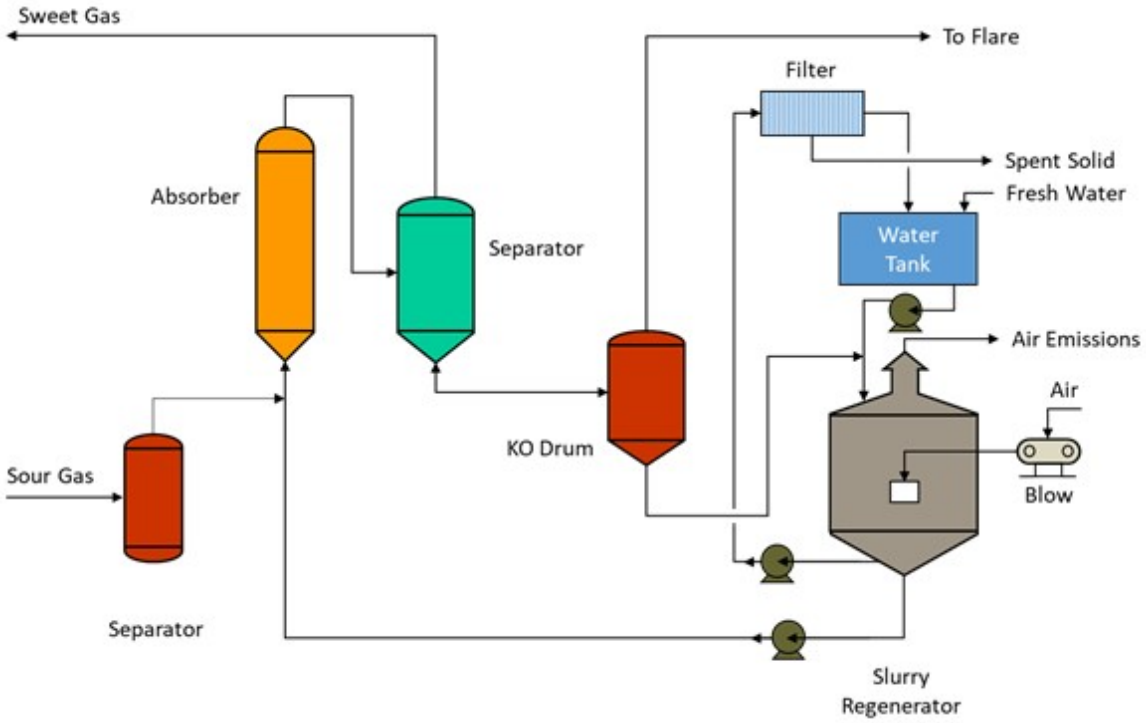


Figure 1 - Slurry Desulfurization Technology Process Flow Diagram